

## Summer Research Program

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# SUMMER RESEARCH PROGRAM

Thirty students from across disciplines spent 10 weeks on campus this summer gaining valuable research experience under the mentorship of one of their professors.

Student Jonathan Janssen worked with English Professor Dr. Josh Matthews exploring the connections between Dante and contemporary works of science fiction.

"What I found was a professor that truly came alongside of me," Janssen says. "He obviously knew much more than I did about the text, and he shared his knowledge with me whenever he could. But he also considered my opinion or ideas to be as valid as anyone else's, challenging them when he didn't quite agree and writing them down when he had not thought of them before."

"Research allows you to dig into the intricacies and wonders of God's amazing creation in a deeper way than we are able to do in a traditional undergraduate setting," says Dr. Justin Vander Werff, professor of engineering. "Creation is one of the books through which God reveals himself, and often research opens windows that allow us to appreciate God's glory, power, and sustenance in new and unique ways."

"Summer research is a way to engage more deeply in topics that we teach," agrees Professor Donald Roth, who



Dr. Kathleen VanTol and Gala Campos Oaxaca are continuing the work they began this summer, using the materials they created to conduct a pilot project with a group of professionals in Nicaragua. The materials are all in Spanish, and Oaxaca helps VanTol create culturally appropriate materials as well as translate and proof-read. She also occasionally rescues VanTol when she's stumped by what a student has written in Spanish. "I really cannot say enough about how important Gala has been to the success of this project. I could not have done this work without her collaboration," says VanTol.



teaches business law and criminal justice courses. “It’s a chance for students to develop a more nuanced or practical understanding of the topics they study.”

This summer the 30 young researchers focused on topics ranging from neurodegenerative diseases to the implications of private colleges losing tax-exempt status to Dante and science fiction to designing a biomechanics lab.

“I learned that research is much more complex than I thought. It requires troubleshooting and problem-solving skills that stretch you intellectually and build your character as you try to find positives in every situation,” says student Leah Breon. “I learned patience when it took several days or even weeks to do one experiment and perseverance when the experiment was botched.”

Collaborative student-faculty research often leads to deeper relationships between students and faculty mentors, too, and it can help them gain new insights and increased awareness about areas of need. For some students, undergraduate research is a way to build their portfolio of experience for graduate school. For others, the opportunity leads to a career in research.

Student Maddie Vande Kamp spent the summer working with Biology Professor Dr. Robbin Eppinga.

“As a result of the experience, I’m interested in exploring research as a career path. I was set on becoming a physician assistant, but this summer I discovered that I’m passionate about the questioning and troubleshooting that goes into biological research,” she says.

“I enjoyed being able to really dig into one topic,” says student Laura Beridon, who worked with Vander Werff. “Often, when doing a project for a class, I don’t have time to stop to figure out why something isn’t working correctly. This summer, if my results weren’t looking the way I thought they should, I had time to dig into the reason why and learned much more as a result.”

“I have found that students see a different side of science when they are

engaged in a research internship,” says Biology Professor Dr. Tony Jelsma. “They see science as less a collection of facts than a process of asking questions, designing experiments, and interpreting data. They see the incremental and sometimes tedious work of collecting good data so that the interpretations can be trusted. These insights are important even if the student doesn’t go on to a career in research.”

While individual researchers and their mentors find their own ways to best work together, Dordt faculty mentors give students a great deal of independence and responsibility, yet are close at hand to answer questions, give feedback, and work through problems.

“Good researchers have inquisitive minds; they want to dig and explore and overturn new stones,” says Vander Werff, adding, “Good researchers are self-motivated; they do good work when they have the freedom, to a certain extent, to set their own agenda and take a project in the direction that feels the most meaningful to them. They tend to ‘ask’ their research what direction it is taking them rather than asking their faculty advisor about every little fork in the road.”

“Good student researchers tend to ‘ask’ their research what direction it is taking them rather than asking their faculty advisor about every little fork in the road.”

— Dr. Justin Vander Werff, Dordt engineering professor

Student Matthew Ojo worked with Roth and says he “learned to work with legal case analyses and to draw inferences from tons of documents. I learned time management and research skills and much more. It’s fun.”

Education Professor Dr. Kathleen VanTol’s student Gala Campos Oaxaca says, “I learned that education in third world countries needs a lot of improvement, and that inclusive education is more than just letting children with disabilities go into a classroom—it’s about changing the way we educate so everyone is able to learn. It’s about breaking barriers.”



Jordan Severson researched, designed, and installed equipment in the new biomechanics lab at Dordt.

Faculty benefit, too. Roth finds that mentoring student researchers in the summer lets him engage important topics even though he is also busy teaching online courses and planning for the upcoming year. “They help push my ideas into new areas that I would not have considered,” he says.

“I find being involved in research important to maintain a good perspective on science. In our courses the biology professors try to equip the students to become scientists, and it helps if we are engaged in this activity ourselves,” says Jelsma.



Students John Davelaar, Maddie Vande Kamp, and Leah Breon collaborated on research in two different areas: nerve-cell interactions and brain health and the spread of invasive Asian Carp in area bodies of water.

And Matthews believes that the undergraduate research project helps him be a better teacher of undergraduate students, and he's using what he learned during the project in ENG 223, his science fiction course, this fall.

"By having Jon talk through the books with me, I figured out how I might teach, for example, the *Divine Comedy* in CORE 180. I have a much better idea of what parts of that poem students will be interested in, as well as what major questions they will have—and what they will be confused by."

"I could not do the research I am doing without the assistance of my student researcher," says VanTol, who is working on special education curriculum for students in Nicaragua. "She brings the cultural perspective and language piece that I do not have. Even though I can read Spanish, I need her help as a native speaker to pick up on the nuances of meaning in the information we gather. She helps me interpret what we learn through the lens of her culture."

This summer's student researchers appreciate how much they grew and learned by being able to delve into a project in a more intense and intentional way.

Janssen recalls that when he learned about the opportunity to spend his summer in the research program, it sounded too good to be true.

"I liked the thought of doing something no one had ever done before and possibly being able to draw totally new conclusions."

— Engineering student Laura Beridon

"Get paid to read books and talk about them? Sign me up!" he said. At the end of the summer his enthusiasm hadn't dimmed. Even though he admits that he had to fight, some days, to keep reading, "It was wonderful to dive deep into an old text tempered with a pair of fresh eyes. Finding associations between different texts was always a delightful 'a-ha!' moment."

## FUNDING

Funds for Dordt's summer research program, which grew to include 30 students this summer, come from multiple sources: designated donor gifts, endowed resources, external grants, and collaborative industry partnerships.

Each year, faculty members apply for funds for specific projects through a peer-review process led by Dordt's Office for Research and Scholarship in conjunction with the Research and Scholarship Council. Once funded, the faculty mentor selects a student from the applications received and sometimes solicited. The students selected spend their summer working in an academically intense research environment.

Whether they worked in a lab or library, other responses were similar.

"I liked the thought of doing something no one had ever done before and possibly being able to draw totally new conclusions," says Beridon.

Ojo adds, "Undergraduate research is something everyone should experience."

SALLY JONGSMA



# 2016 UNDERGRADUATE SUMMER RESEARCH PROJECTS

## ***Beginning Beekeeper Support—Alayna Gerhardt and Immanuel Feodor, mentored by Dr. Duane Bajema***

A Sustainable Agriculture, Research, and Education (SARE) grant provided funds to assist beginning beekeepers in the tristate region and hold two area field days, providing hands-on education for beekeepers. Chibundo Onyia also helped analyze the level of spores of the *Nosema* parasite in the bees of the region.

## ***Converting Existing Research Software to Exploit GPU Computing—Jeremy Klyn, mentored by Dr. Nick Breems***

Klyn helped write custom GPU kernels to accelerate research computing on Dordt's powerful new GPU-based high performance computer cluster.

## ***Characterizing how Myosin5 Supports Nerve-Cell Interactions and Brain Health—Leah Breon, John Davelaar, and Maddie Vande Kamp, mentored by Dr. Robbin Eppinga***

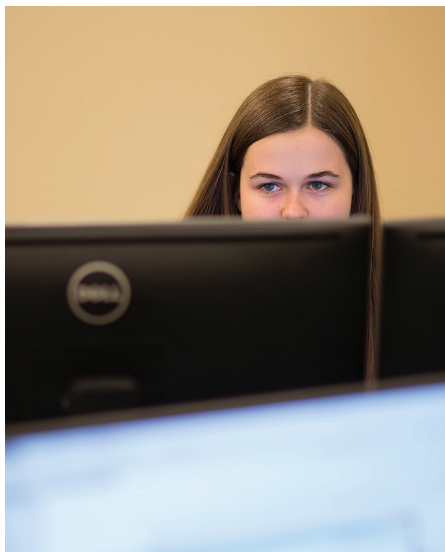
Students characterized the interaction between two proteins found in neurons—Myosin5 and PACSIN—continuing previous research that identified these proteins as potential partners whose function may involve the communication between nerve cells underlying proper brain function.

## ***Using Environmental DNA (eDNA) Technology to Survey the Little Sioux Watershed for Invasive Silver Carp for the Iowa Department of Natural Resources—Maddie Vande Kamp, John Davelaar, and Leah Breon, mentored by Dr. Robbin Eppinga***

The students investigated the spread of invasive Asian Carp (specifically Silver Carp) in local river systems by developing techniques to identify species-specific DNA in the water.

## ***Developing Facilities for Shoulder Biomechanics Research—Jordan Severson, mentored by Dr. Kayt Frisch***

Severson designed, built, and installed the equipment needed for a new Carver-funded biomechanics lab. The lab will be used in biomechanics engineering classes and to study shoulder mechanics in



JAMIN VERVELDE (99)

Laura Beridon conducted research on bridge strength during earthquakes, but she did it all with computer modeling in the engineering lab.

GPAC women's volleyball players during the 2016 season. The lab will integrate a wearable force sensor designed by engineering senior design teams during the past few years with other motion capture lab equipment.

## ***Histological Studies of a Mouse Model for Batten Disease—Chibundo Onyia, mentored by Dr. Tony Jelsma***

Batten disease is an incurable and progressive genetic disease in which protein and lipid deposits accumulate in neurons in the brain. The gene mutations that cause the disease have been identified, but their functions are not understood. Onyia used histological stains and antibodies to compare organs of genetically modified mice having the disease with those of normal mice. The goal is to help develop treatment strategies.

## ***A Culturally Sensitive Model for Inclusive Education—Gala Campos Oaxaca, mentored by Dr. Kathleen VanTol***

Gala and VanTol worked on creating materials in Spanish to help support inclusive educational practices in Latin American countries. This summer they focused on how to promote parent and family involvement in education of children with special needs. They are piloting these modules with a group of

24 professionals in Nicaragua who agreed to give feedback in return for access to these materials.

## ***Dante in Science Fiction, Dante as Science Fiction—Jonathan Janssen, mentored by Dr. Josh Matthews***

The project looked at why certain science fiction authors and movements were influenced by Dante and whether and how Dante fits into a broader history of science fiction.

## ***Preparing for a Loss of Tax Exemption—Matthew Ojo, mentored by Donald Roth***

Ojo researched trusts, corporate law, tax law, college administration, college finance, and institutions who have lost tax exemption. Particular interest was paid to Bob Jones University and its survival as an institution.

## ***Operative Metaphor and Exegesis—Justin Vos, mentored by Donald Roth***

Certain metaphors guide our understanding of Christian discipleship. Vos researched the work of theologians to determine their operative metaphors and how they affect the way those authors read Scripture and speak about discipleship.

## ***Investigation into Seismic Acceleration Effects on Bridges—Laura Beridon, mentored by Dr. Justin Vander Werff***

Beridon continued research begun by Vander Werff and former student Juan Benitez to improve computer simulation of a bridge under seismic acceleration. She used data from actual earthquakes and compared it to experimental results. The model incorporated vertical and horizontal accelerations simultaneously.

## ***Sharing Expertise in the Structural Performance of Truck Frames—Jonathan Attema, mentored by Justin Vander Werff***

Attema worked with Vander Haag's, Inc., to conduct a structural analysis of their truck frame modifications. His work provided Vander Haag's with confidence in their design and helps them communicate to others why the design is trustworthy.